TECHNICAL NOTE

Liquid Chromatography

Flexar PDA Plus Detector

Detector Flow Cells with Different Path Length for Wide Linearity Range and Adjustable Level of Sensitivity

The PerkinElmer® Flexar™ PDA Plus™ detector has two modular flow cells with path lengths of 10 mm and 50 mm. The 50 mm flow cell provides up to five times more sensitivity than the 10 mm path length flow cell. Thus, the 50 mm flow cell is suitable for samples with lower analyte concentration whereas the 10 mm flow cell is adequate for samples with relatively high analyte concentration. The two levels of sensitivity provided by the modular flow cells offer options that otherwise would require the use of different types of detectors. In addition to its functionality, the unique design of these modular flow cells makes their installation virtually effortless with just one motion.

A solution for achieving lower quantitation limit than with conventional UV or PDA detector

Figures 1, 2 and 3 represent chromatograms from the analysis of a solution containing 0.2 µg/mL acetaminophen and aspirin using a conventional UV/Vis detector, and the Flexar PDA Plus Detector. The two compounds are detected when the PDA Plus is used, whereas none of them are detected when a conventional UV/Vis detector is used. As shown on Table 1, when the 50 mm flow cell is used, the limit of quantitation is four times lower. The upper limit is twice as low as with the 10 mm flow cell because higher signals on the 50 mm flow cell are above the electronic threshold of the detector.

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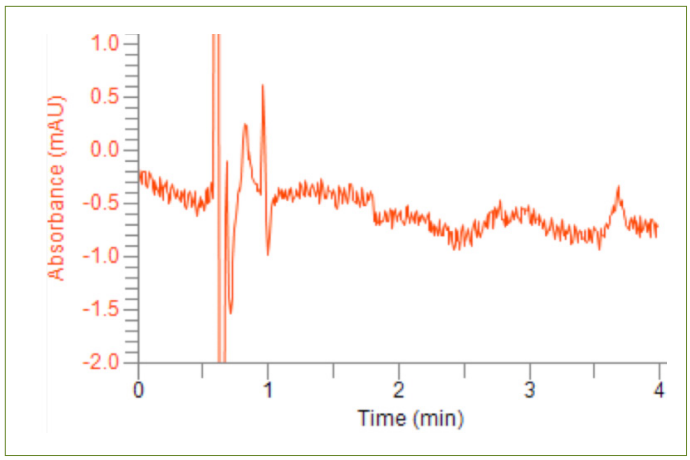

Figure 1: Chromatogram from the analysis of a 2 µ/mL solution, using a conventional UV/Vis detector.

Chromatographic conditions:

Mobile phase: 69:28:3 water/methanol/acetic acid
Sample solvent: Mobile phase
Flow/injection: 0.3 mL/min; 2 µL
Flush solvent: 5% acetonitrile in water
Column: Brownlee™ SPP C18, 100 x 2.1 mm, 2.7 µm at 45 °C (Cat# N9308404)
Analytical wavelength: 275 nm
Chromera® version 4.0. Sampling rate: 5 pts/sec

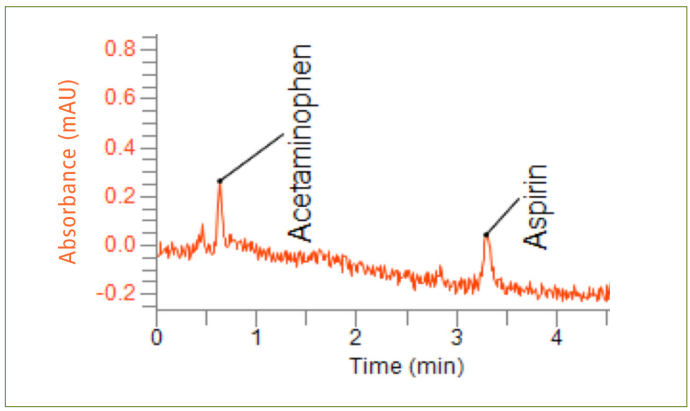

Figure 2: Chromatogram from the analysis of 2 µ/mL solution, using the PDA Plus with a 10 mm flow cell.

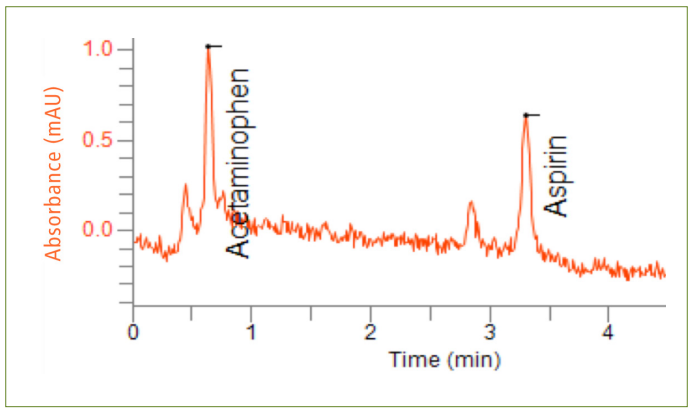

Figure 3: Chromatogram from the analysis of 2 µ/mL solution using the PDA Plus with a 50 mm flow cell.

Table 1. Linearity range

Detector	Compound	Linearity Range (µg/mL)	R-square
Conventional UV/Vis	Acetaminophen	1.67 - 1000	0.9999
	Aspirin	5.20 - 1000	1
PDA Plus with 10 mm flow cell	Acetaminophen	0.84 - 1000	0.9999
	Aspirin	0.84 - 1000	0.9994
PDA Plus with 50 mm flow cell	Acetaminophen	0.20 - 500	0.9996
	Aspirin	0.20 - 500	1

Switching from the 10 mm to the 50 mm flow cell results in a five-fold increase in response

Figures 4 and 5 represent chromatograms of a solution of hops α-acids analyzed on the Flexar FX-15 fitted with the PDA Plus™ detector. As shown in Table 2, there is a five-fold increase in response when switching from a 10 mm to a 50 mm path length flow cell.

Chromatographic conditions:

Mobile phase: 35%: 0.1% phosphoric acid,
0.2 mmol/L EDTA 2NA 65% B: acetonitrile
Sample solvent: 8:2 methanol/0.1% TFA in water
Flow/injection: 1 mL/min; 4 µL volume
Flush solvent: 1:1 methanol/water
Column: Brownlee™ SPP C18, 100 x 3.5 mm, 2.7 µm at 40 ° C (Cat# N9308410)
Analytical wavelength: 270 nm
Chromera® version 4.0, sampling rate 5pts/sec

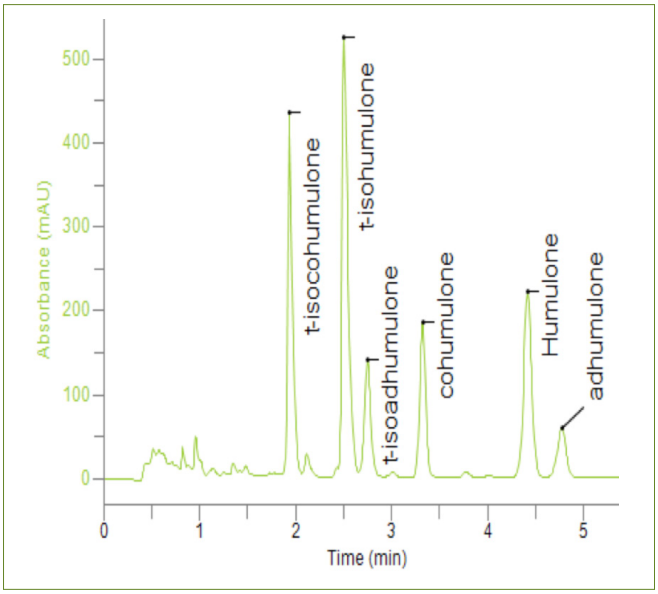

Figure 4. α-acids in hops using the PDA Plus a flow cell with a 10 mm path flow cell.

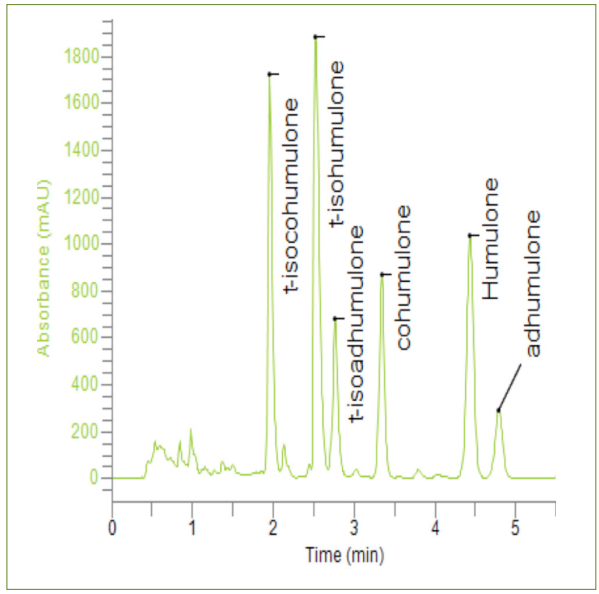

Figure 5. α-acids in hops using the PDA Plus a flow cell with a 50 mm path flow cell.

Table 2. Response from the analysis with the PDA Plus detector fitted with 10 mm and 50 mm flow cells.

Flow Cell path length	t-isocohumulone	t-isohumulone	t-isoadhumulone	Cohumulone	Humulone	adhumulone
10 mm	1542353	2264386	658316	821539	1294058	395848
50 mm	7226540	10548112	3147941	3919426	6099670	1899734
X times improvement	4.7	4.7	4.8	4.8	4.7	4.8

PerkinElmer's PDA Plus, with its interchangeable modular flow cells, covers the widest detection range of any PDA or typical UV/Vis detector on the market. As shown in this technical note, the PDA Plus' exceptional sensitivity enable the quantitation of analytes at levels that might not have been quantifiable or otherwise may have gone undetected by other UV or PDA detectors.

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